



What the Hull is Going On?

A Preliminary Look at the Fouling-Related Practices of Vessels in California

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Shipping-Related Nonindigenous Species (NIS) Vectors

- Ballast Water



Shipping-Related NIS Vectors

- Vessel Fouling



Shipping-Related NIS Vectors

- Vessel Fouling
 - Commonly referred to as “Hull Fouling”
 - Niche areas – Sea chests, rudder, propeller, propeller shaft, thrusters, dry dock support strips (DDSS)



Vessel Fouling as NIS Vector

- > 70% of all established NIS introductions to coastal N. America may have been fouling-mediated (Fofonoff et al. 2003)
- 26.8% of established NIS in SF Bay have been associated with fouling (Cohen and Carlton 1995)



Vessel Fouling and Industry

- Unlike ballast water organisms, fouling organisms are expensive
- Fouling = Drag = Fuel Consumption = \$\$

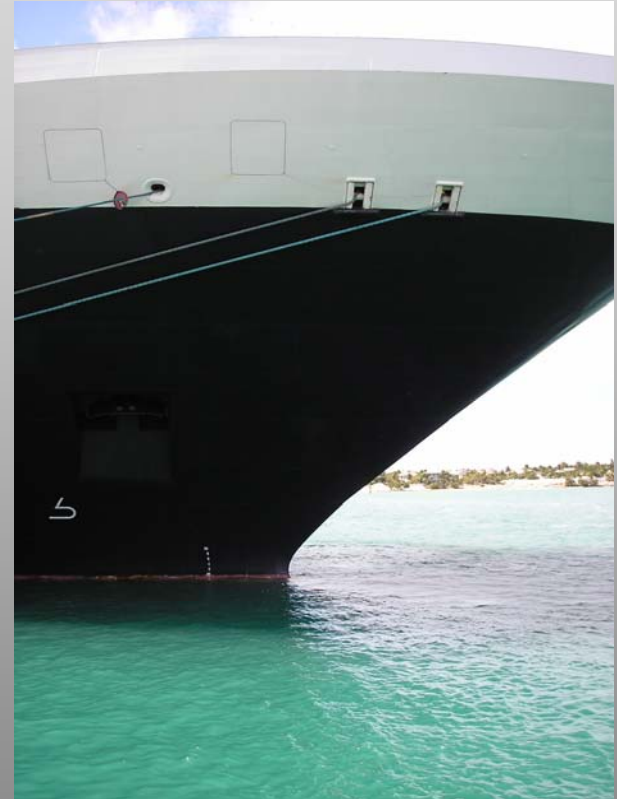


Vessel Fouling in CA

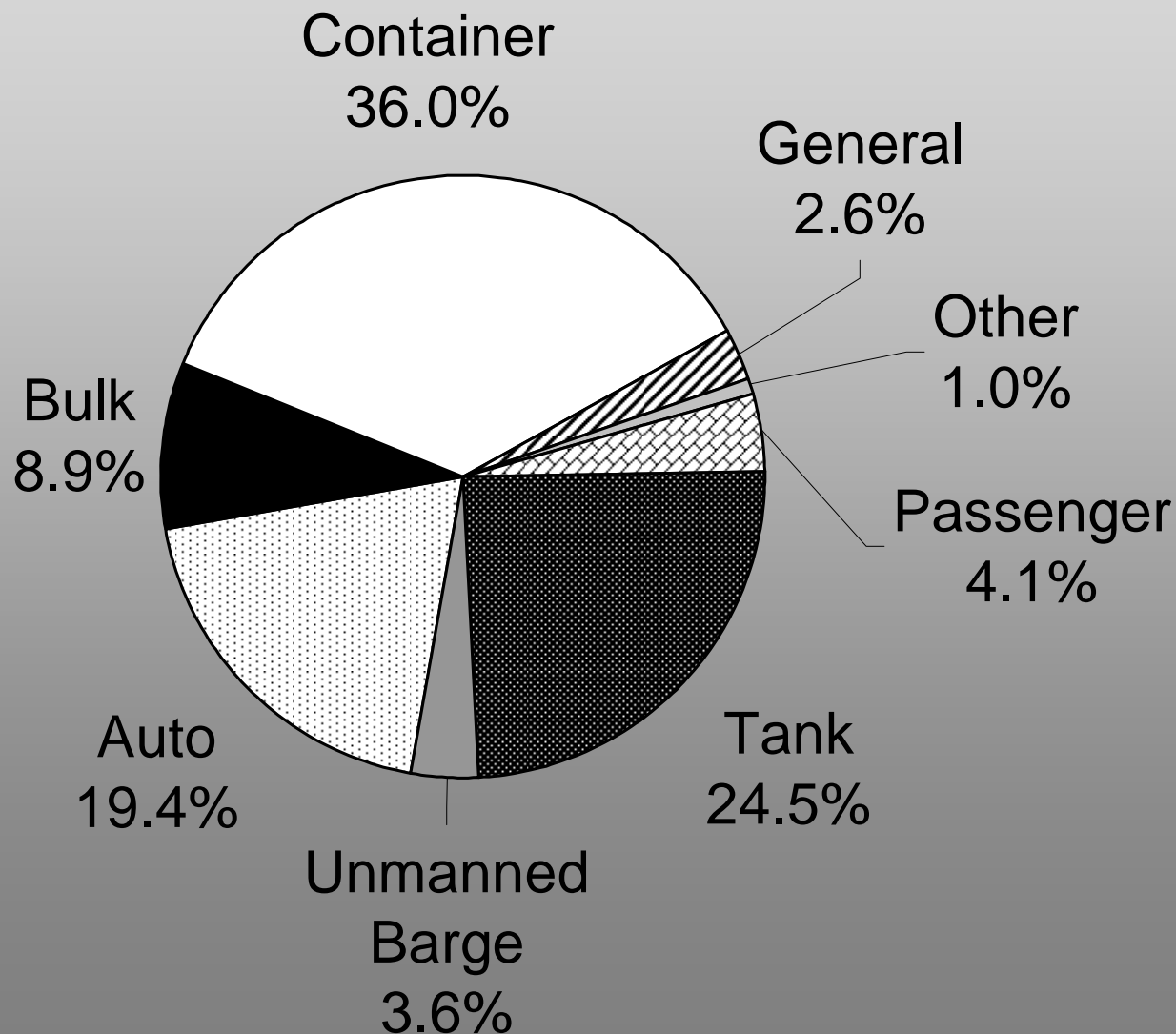
- Limited baseline information on vessel fouling across vessel types that regularly operate in CA
- Limited information on effects of voyage characteristics on accumulation of fouling organisms
- Limited information on husbandry practices regarding niche areas

Hull Husbandry Reporting Form

- 10 Question Survey
- Separated into 2 sections:
 - Husbandry Practices
 - Last Dry Dock (Delivery)
 - Type and age of AF treatment
 - In-water cleaning
 - Voyage Characteristics
 - Port residency time
 - Traveling speed
 - Freshwater ports (including Panama Canal)



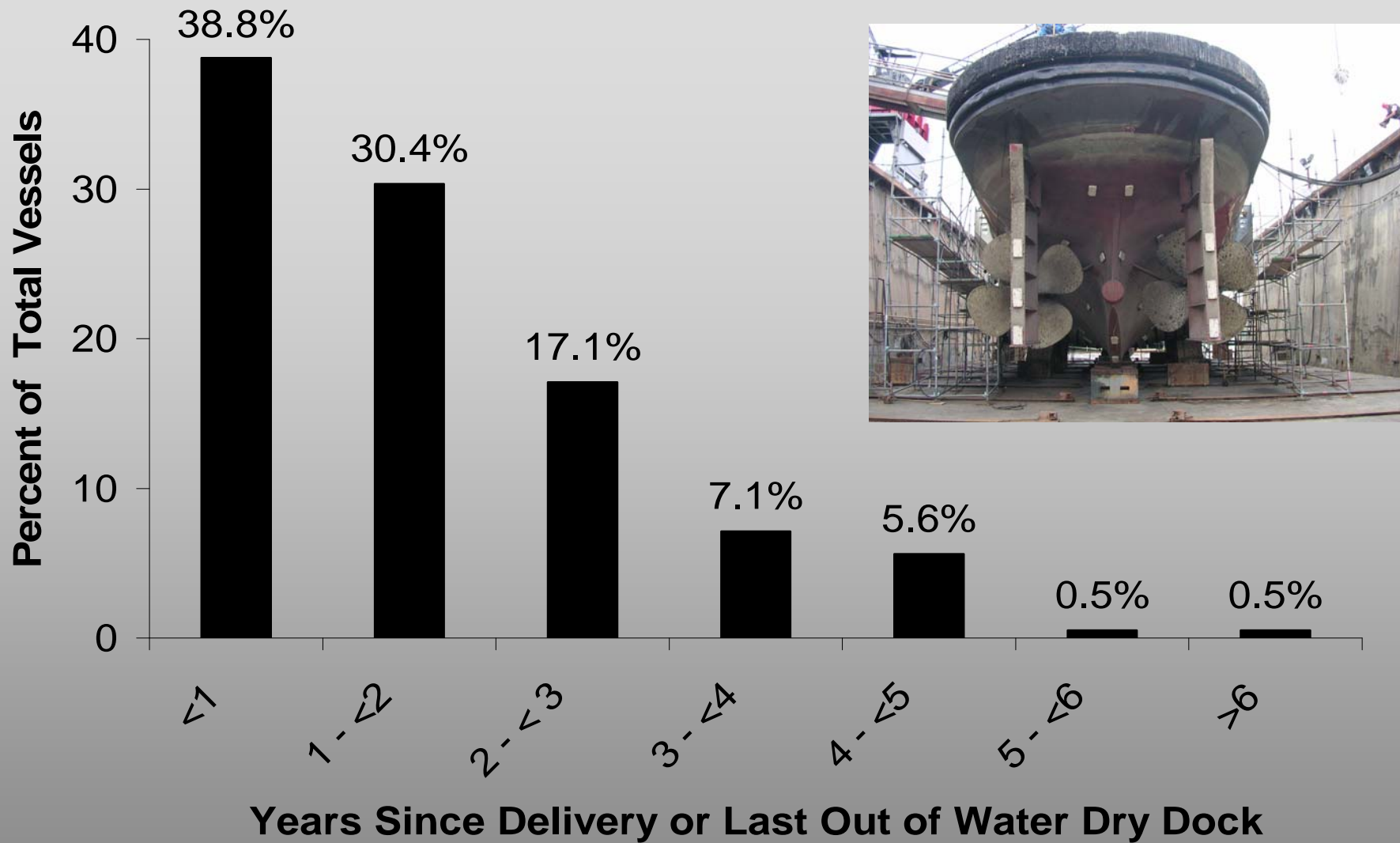
Vessel Population Evaluated



n = 400 vessels

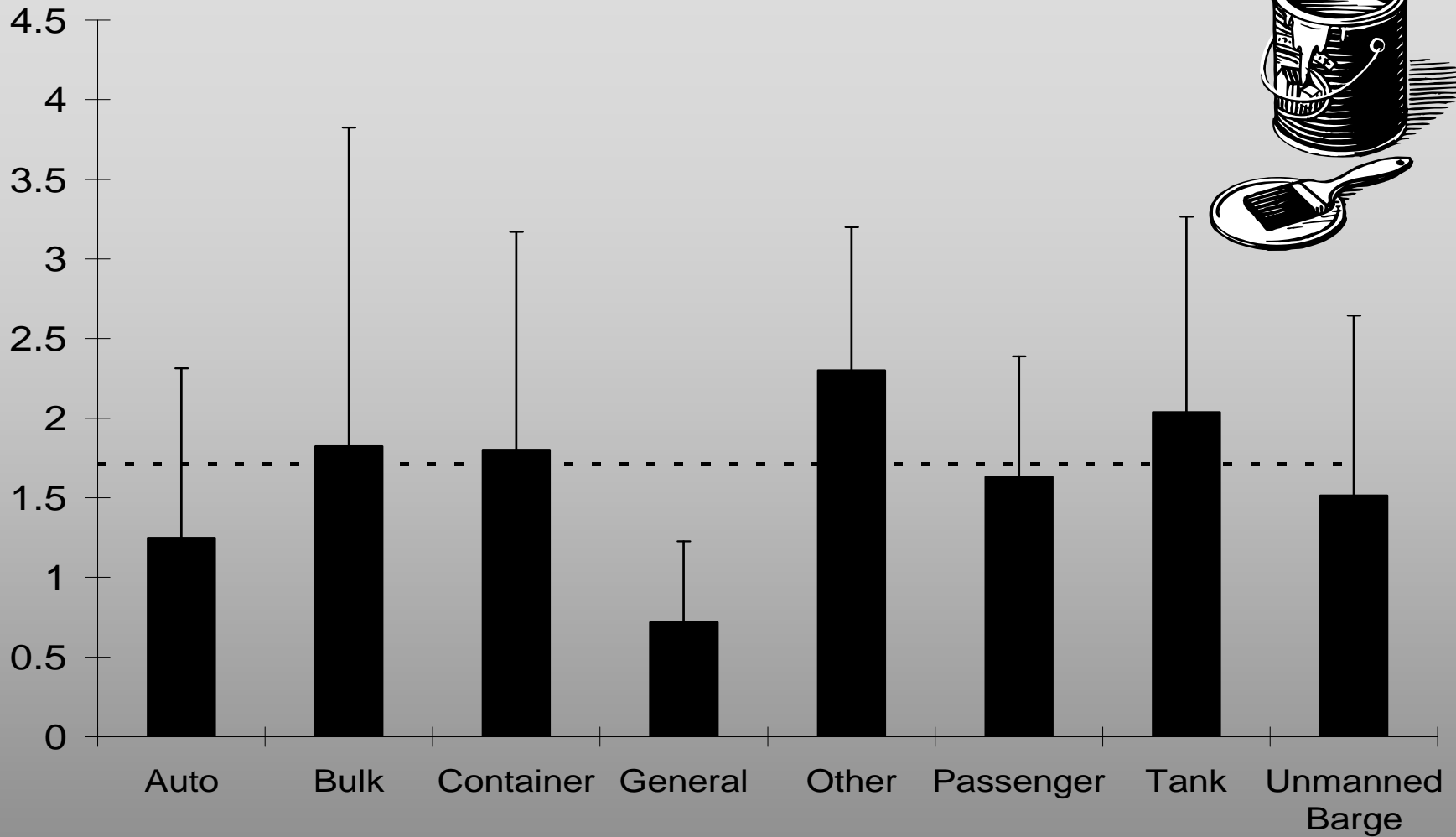
Husbandry Practices



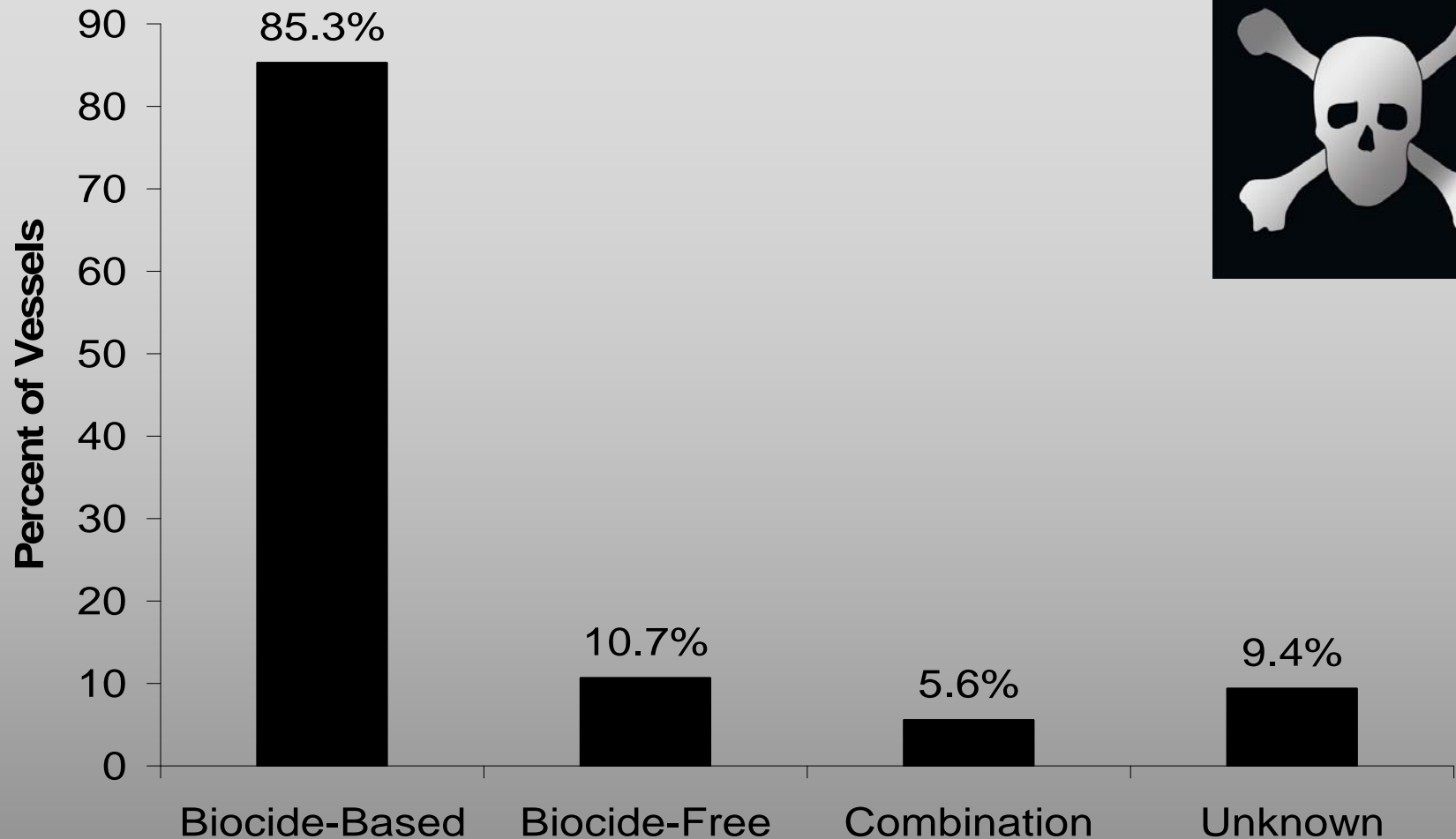


- 99 % within past 5 years
- 86.3 % within past 3 years

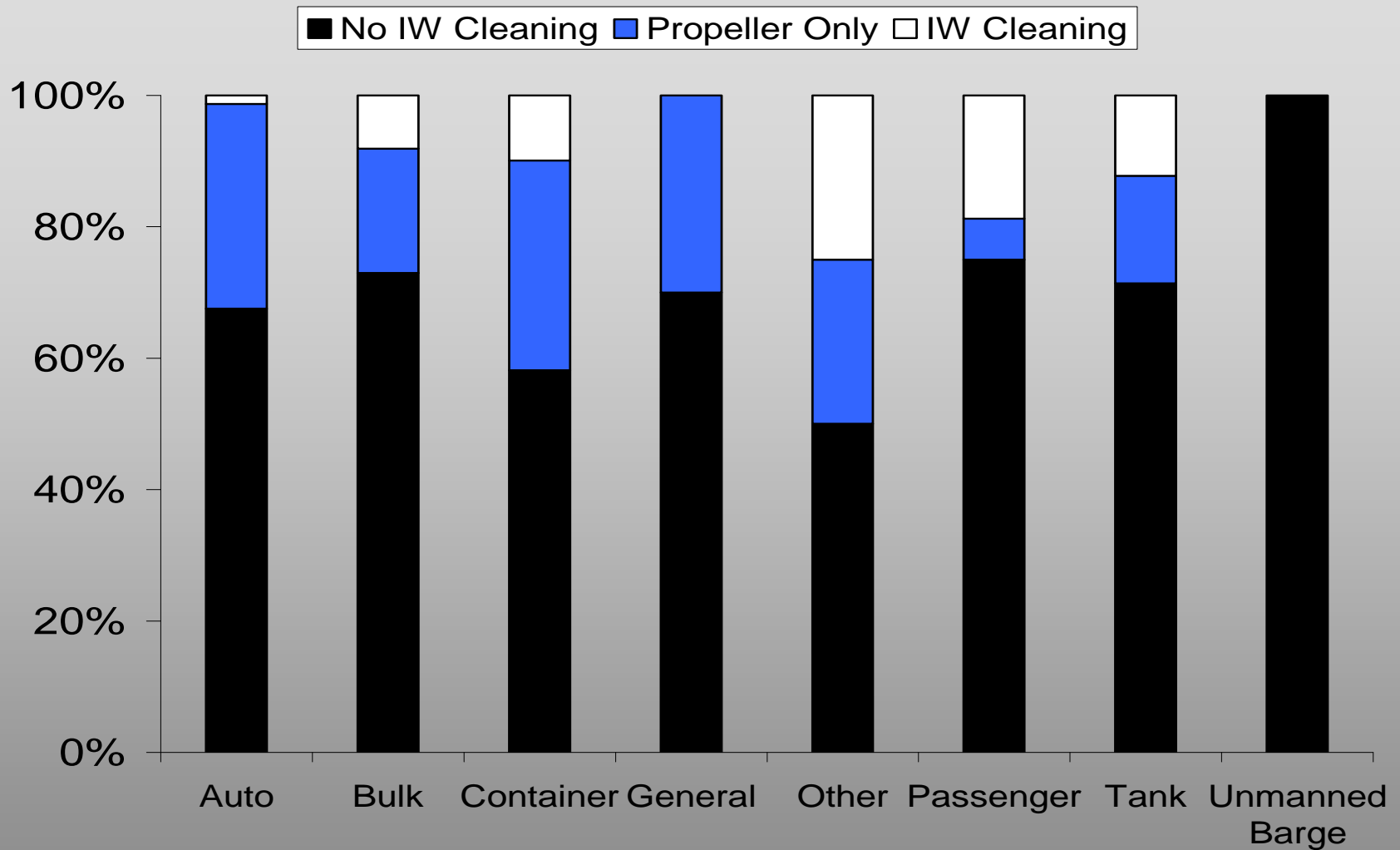
Age (Years) of AF Treatment



- 7 of 8 vessel types average 2 years or less

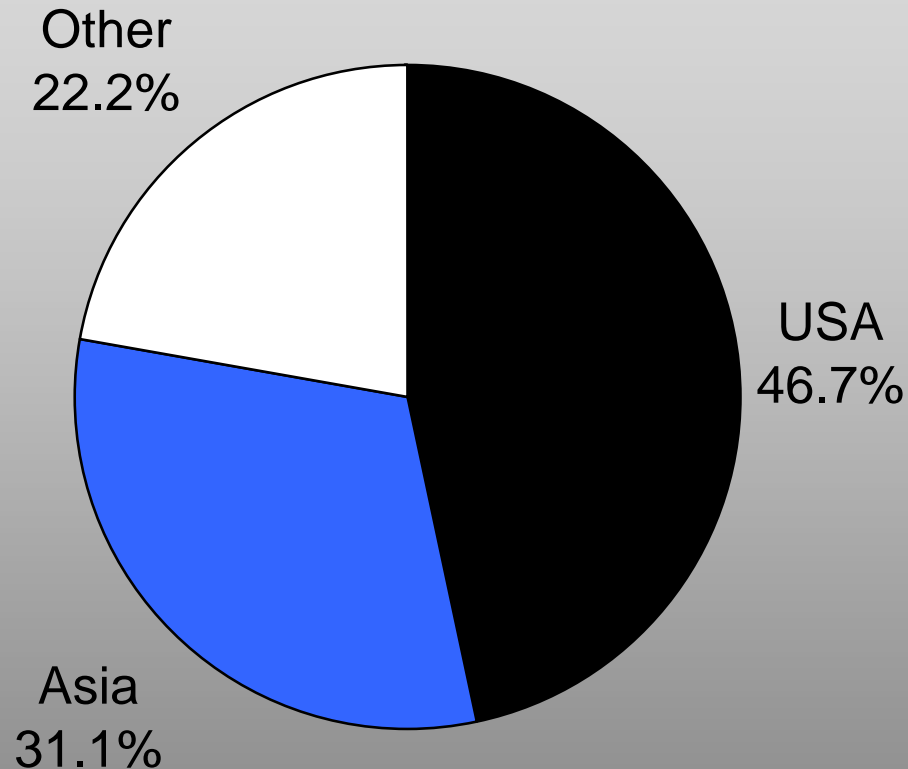


- Biocide-free coatings limited to 3 vessel types
 - Passenger (28%), Container (22%), and Tank (8%)



- 24.4% have conducted propeller polishing only
- 8.6% have undergone IW cleaning to hull or niche areas

Geographic Location of IW Cleaning



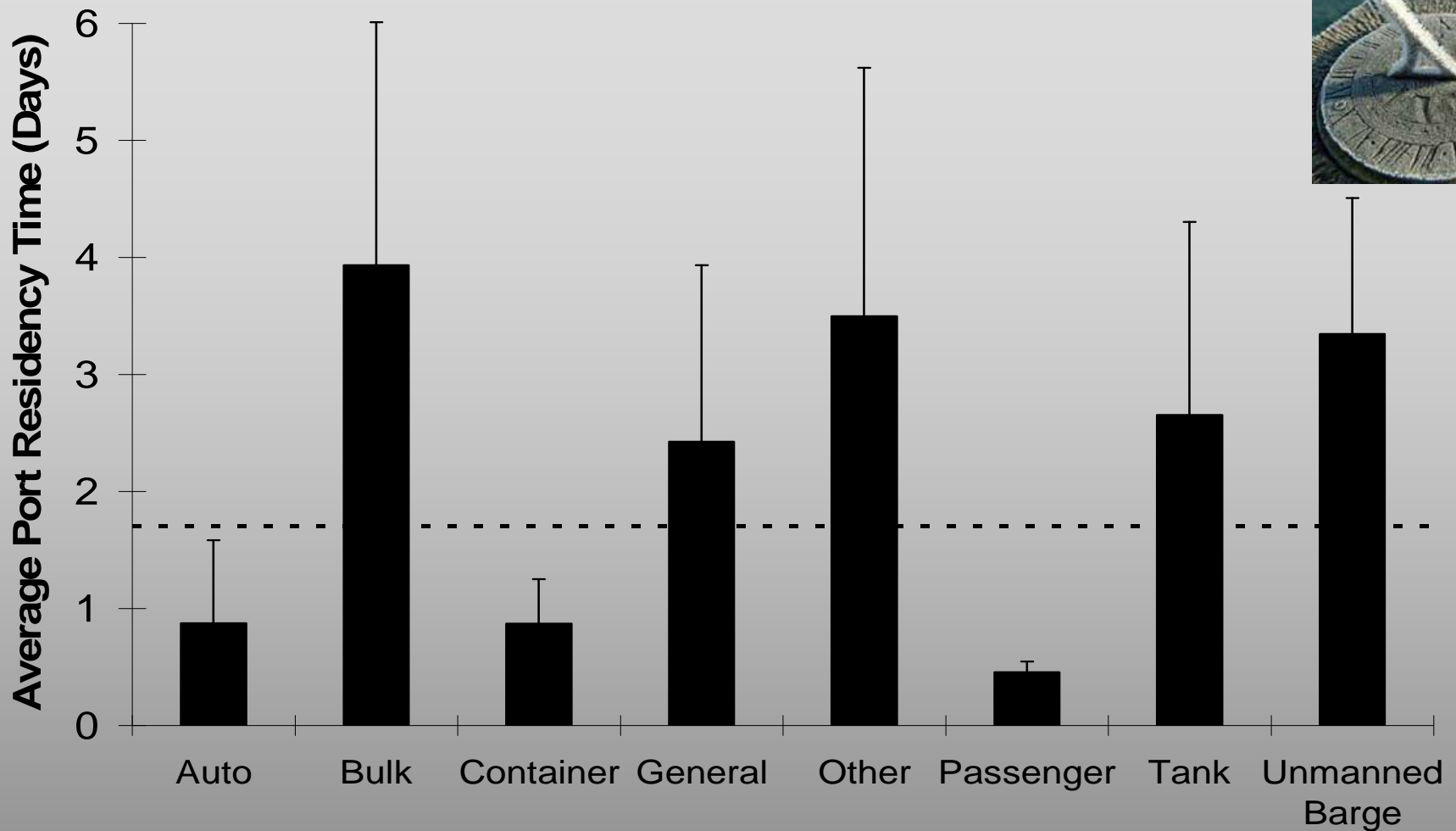
- Over 85 % of vessels cleaned within USA have been cleaned in California
 - Nearly all in LA-LB

Husbandry Practices

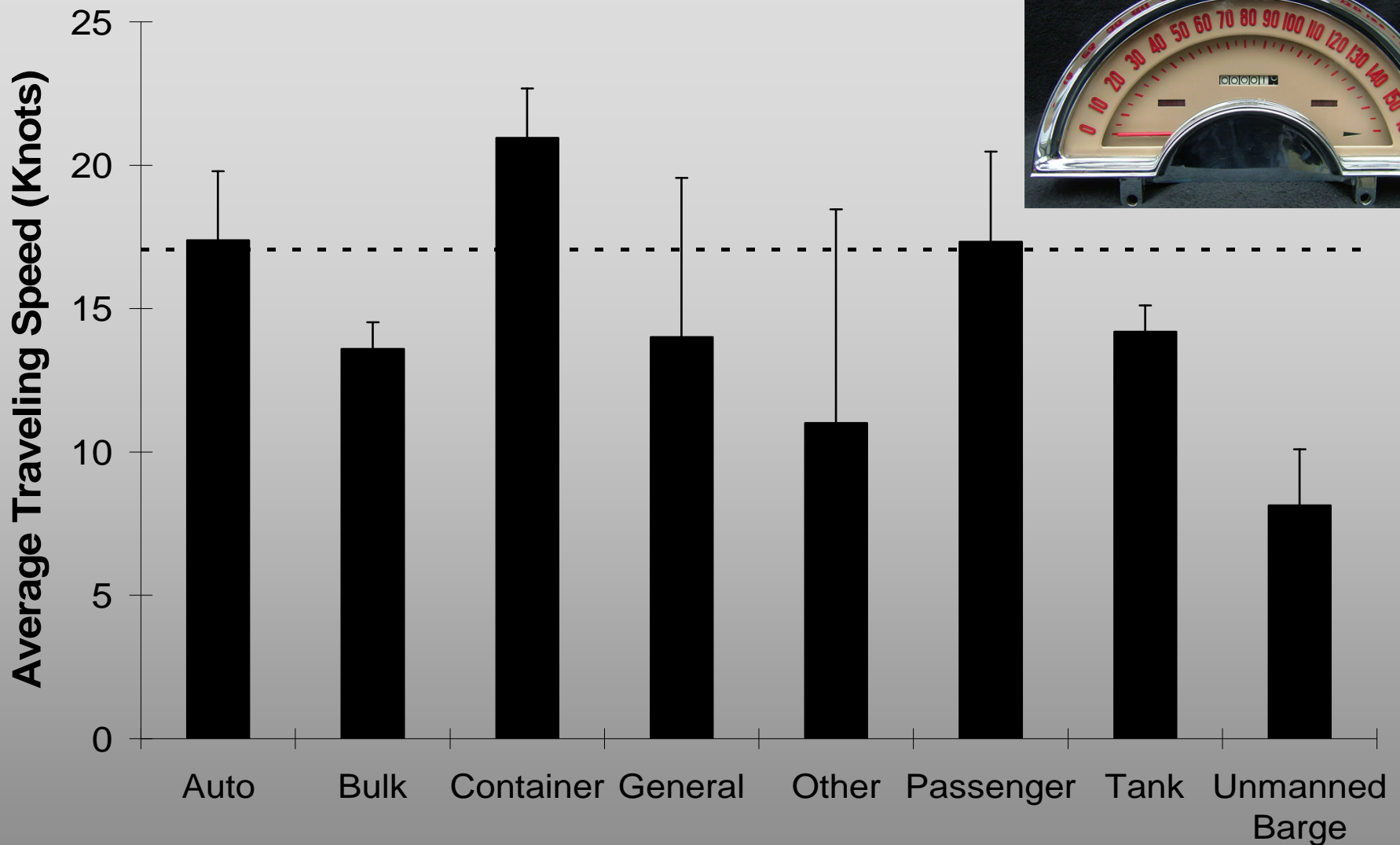
- Almost all vessels (99%) have been cleaned of fouling organisms and treated with AF coatings within the past 5 years
 - Most within 3 years
 - Majority (>85%) of AF coatings contain at least 1 biocide
 - Vessel types conducting IW cleaning also have longest average time since delivery/dry dock
- Measures are being taken to prevent accumulation of fouling organisms
- In line with economic interests of industry

Voyage Characteristics

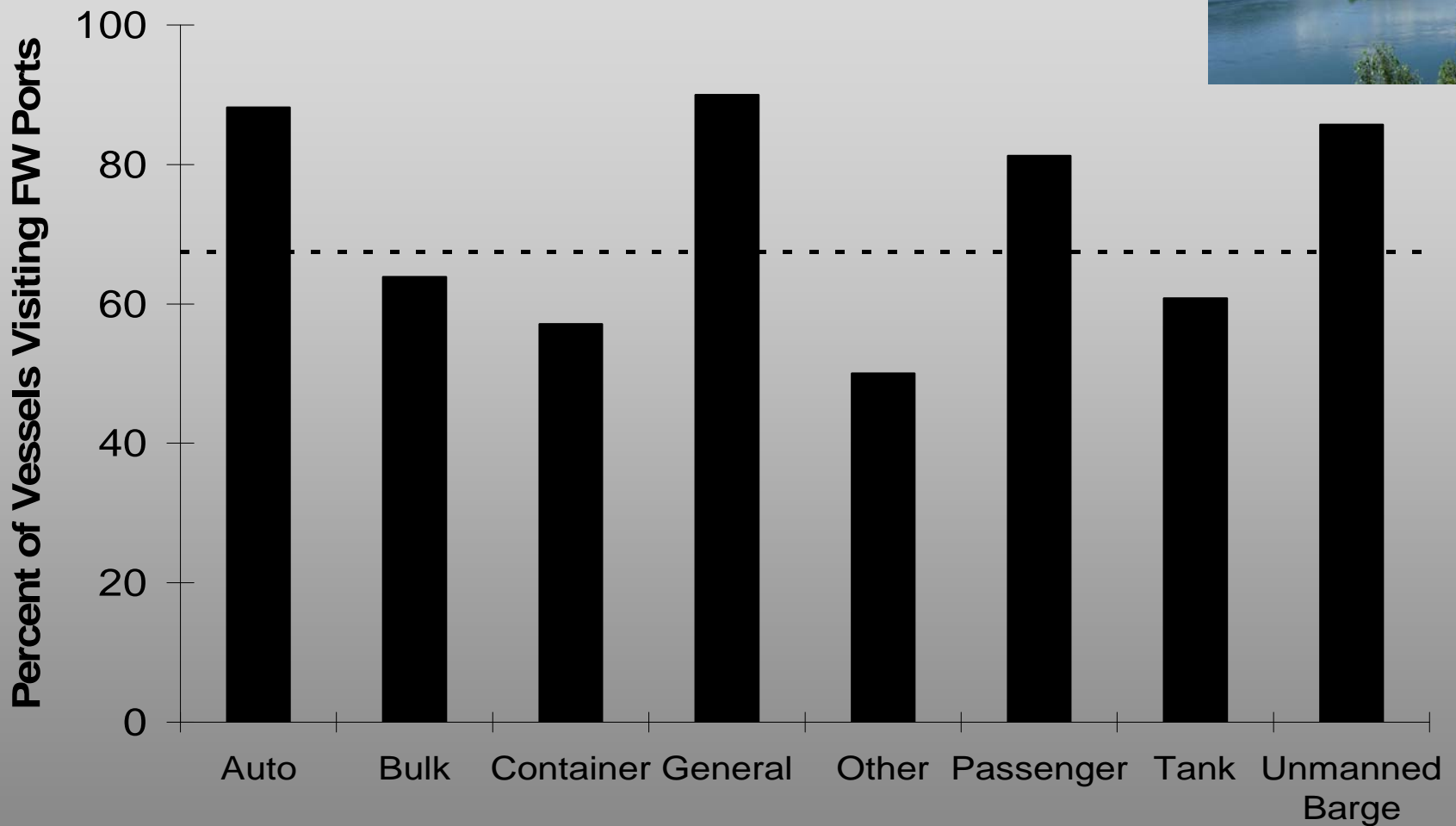




- Auto (0.87 d), Container (0.87 d), Passenger (0.46 d) vessels each averaged less than 1 day in port
- Bulk (3.9 d), Unmanned Barge (3.3 d), Other (3.5 d) vessel types each averaged over 3 days in port



- Container (21.0), Auto (17.4), and Passenger (17.3) vessels travel at speeds greater than 17 knots
- Slowest = Unmanned Barges (8.1 knots)



- 67% of all vessels have visited at least 1 FW port since last cleaning

Voyage Patterns

- Auto, Container, and Passenger vessels tend to have voyage characteristics thought to result in lower risk of NIS introductions
 - Short port residency times (< 1 day)
 - Elevated traveling speeds (> 17 knots)
 - Container and Passenger vessels also tend to use biocide-free AF coatings
 - Freshwater port calls

Voyage Patterns

- Barges, Bulk, and 'Other' vessels tend to have voyage characteristics thought to result in greater risk of NIS introductions
 - Long average port residency times (> 3 days)
 - Slower traveling speeds
 - Barges also 1 of 2 vessel types (also General) that report no IW cleaning

Summary

- Preliminary evaluation
- Husbandry practices are being conducted regularly in an attempt to remove and prevent fouling organisms fleet-wide
- Voyage characteristics suggest the potential for reduced risk for some vessel types and increased risk for others
- Will be fully analyzed in conjunction with currently funded research to develop regulations to be adopted by January 2012

Thank You

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